TABLE 1.—*Minimum temperature estimates for Walla Walla, Wash., on nights during the spring seasons 1919 to 1922, inclusive, using hygrometric, maximum-minimum, and median temperature methods. (Dates given in the table include all nights after March 15, with heavy or killing frost.)*

| Date. | Hygrometric chart method. | Maximum-minimum method. | Constant subtracted from wet-bulb temperature. | Median temperature method. | Average of all methods. | Recorded minimum. | Difference. |
|---|---|---|---|---|---|---|---|
| 1919. | | | | | | | |
| Mar. 20 | 34 | 31 | 31 | 26 | 30 | 29 | +1 |
| 21 | 32 | 34 | 32 | 29 | 32 | 32 | 0 |
| 22 | 29 | 33 | 33 | 26 | 30 | 30 | 0 |
| 24 | 33 | 35 | 32 | 26 | 32 | 30 | +2 |
| 25 | 25 | 28 | 27 | 23 | 26 | 29 | −3 |
| 26 | 29 | 32 | 31 | 30 | 30 | 31 | −1 |
| Apr. 12 | 28 | 30 | 30 | 26 | 28 | 30 | −2 |
| 15 | 31 | 33 | 30 | 28 | 30 | 29 | +1 |
| May. 4 | 30 | 31 | 31 | 34 | 32 | 31 | +1 |
| 1920. | | | | | | | |
| Mar. 17 | 21 | 25 | 25 | 23 | 24 | 25 | −1 |
| 1921. | | | | | | | |
| Mar. 27 | 28 | 30 | 28 | 24 | 28 | 30 | −2 |
| 30 | 30 | 33 | 31 | 27 | 30 | 31 | −1 |
| 31 | 31 | 35 | 32 | 27 | 31 | 31 | 0 |
| Apr. 4 | 23 | ..... | 26 | 34 | 27 | 29 | −2 |
| 7 | 27 | 31 | 28 | 23 | 27 | 30 | −3 |
| 8 | 30 | 32 | 29 | 29 | 30 | 30 | 0 |
| 9 | 31 | 37 | 34 | 26 | 33 | 31 | +2 |
| 1922. | | | | | | | |
| Mar. 28 | 25 | 25 | 27 | ..... | 26 | 28 | −2 |
| Apr. 12 | 28 | 28 | 26 | 24 | 26 | 29 | −3 |
| May 9 | 28 | 33 | 28 | 26 | 29 | 29 | 0 |

## THE TEMPERATURE AT PORTO VELHO, AMAZONAS, BRAZIL.

BY ALFRED J. HENRY.

Through the courtesy of Dr. Frederick L. Hoffman, statistician, Prudential Insurance Co., the Weather Bureau has been supplied with almost 14 years of climatological observations made by the Engineering Department of the Madeira-Mamore Railway at its eastern terminal, Porto Velho, on Madeira River just above the point where navigation on that river is interrupted by rapids and falls.

The monthly totals of rainfall will appear in an early number of this REVIEW.

The temperature observations were made at the hours 6:30 and 11:00 a. m. and 3:00 and 6:30 p. m. except that the last-named hour was changed to 5:30 beginning with June, 1917. No one of these hours alone, or any combination of them which might be made, would yield results that would closely approximate the mean temperature of the 24 hours, hence the means for each separate hour have been computed and are presented in Table 1. These data give a close approximation to the daily range in temperature for each month of the year. It may be seen by simple inspection that the mean temperature rises about 10° daily from 6:30 a. m. to 3:00 p. m. during the wet season, which extends from November to May, and as much as 15°, on the average, in the winter or dry season. Since the occurrence or nonoccurrence of showers in the afternoon would have an important influence on the afternoon maximum, it is inferred that relatively dry months in the wet season would be favorable to high temperature.

The highest temperature recorded at any of the observing hours was 104° F. in October, 1914. Temperatures of 100° F. were also recorded in August and October, 1916, and in September, 1917. September is the month of greatest maxima and February the least.

The lowest temperature recorded during the period of observations was 56° F. in June, 1916, at 6:30 a. m. I have compiled from the daily observations the observed extremes for each month and present them in Table 2. The means given at the bottom of this table may be considered as approximate means of the monthly extremes from which may be obtained the average monthly range of temperature. An inspection of these mean results shows that the range is greatest in the winter months of June-August and least in the summer months of January-February.

It is interesting to note that Porto Velho temperatures were at a maximum in 1914–15, and at a minimum in 1916–17, as noted for Arequipa.[1]

TABLE 1.—*Monthly mean temperature at Porto Velho, Brazil, for the hours named, January, 1908, to November, 1921.*

[Approximate latitude 8° 44′ S., longitude 64° 00W. Elevation, —.]

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Annual. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6:30 a. m. | 76.1 | 76.2 | 76.2 | 76.4 | 75.5 | 73.4 | 72.2 | 73.9 | 76.0 | 76.5 | 76.3 | 76.0 | 75.4 |
| 11:00 a. m. | 82.1 | 82.1 | 82.8 | 83.2 | 83.0 | 83.1 | 83.9 | 85.4 | 86.3 | 85.2 | 84.2 | 82.5 | 83.7 |
| 3:00 p. m. | 85.1 | 85.1 | 85.5 | 85.2 | 86.1 | 86.5 | 88.2 | 90.4 | 90.6 | 88.5 | 87.0 | 85.3 | 87.0 |
| 6:30 p. m. | 82.6 | 82.5 | 82.6 | 83.0 | 83.1 | 83.9 | 85.7 | 86.3 | 86.6 | 85.1 | 83.8 | 82.9 | 84.0 |

TABLE 2.—*Approximate monthly extremes of temperature for Porto Velho, Amazonas, Brazil.*

[Maxima taken mostly from observations at 3 p. m. and minima taken from the 6:30 a. m. observations.]

| Year. | | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Annual. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1908 | max. | 93 | 92 | 95 | 95 | 91 | 95 | 91 | 94 | 96 | 93 | 92 | 92 | 96 |
| | min. | 73 | 72 | 72 | 73 | 66 | 65 | 63 | 63 | 67 | 72 | 72 | 70 | 63 |
| 1909 | max. | 93 | 89 | 90 | 89 | 89 | 90 | 91 | 96 | 97 | 96 | 93 | 91 | 97 |
| | min. | 72 | 72 | 72 | 72 | 57 | 63 | 57 | 58 | 63 | 72 | 70 | 70 | 57 |
| 1910 | max. | 93 | 90 | 87 | 90 | 90 | 90 | 92 | 96 | 98 | 95 | 98 | 91 | 98 |
| | min. | 71 | 73 | 74 | 73 | 69 | 67 | 68 | 62 | 74 | 72 | 77 | 73 | 62 |
| 1911 | Max. | 92 | 94 | 91 | 91 | 92 | 89 | 94 | 95 | 97 | 94 | 94 | 92 | 97 |
| | min. | 74 | 74 | 70 | 71 | 70 | 58 | 63 | 66 | 70 | 70 | 75 | 75 | 58 |
| 1912 | max. | 94 | 94 | 94 | 91 | 92 | 90 | 93 | 94 | 94 | 94 | 91 | 93 | 94 |
| | min. | 75 | 76 | 74 | 74 | 71 | 75 | 58 | 68 | 68 | 76 | 75 | 73 | 58 |
| 1913 | max. | 92 | 91 | 92 | 91 | 90 | 90 | 94 | 99 | 97 | 94 | 95 | 97 | 99 |
| | min. | 74 | 75 | 75 | 74 | 72 | 70 | 68 | 66 | 72 | 74 | 75 | 68 | 66 |
| 1914 | max. | 90 | 90 | 92 | 93 | 92 | 94 | 93 | 96 | 96 | 104 | 98 | 94 | 104 |
| | min. | 74 | 76 | 74 | 72 | 68 | 70 | 71 | 70 | 73 | 74 | 72 | 72 | 68 |
| 1915 | max. | 96 | 94 | 96 | 96 | 96 | 92 | 95 | 98 | 95 | 95 | 93 | 92 | 98 |
| | min. | 74 | 72 | 76 | 74 | 74 | 62 | 58 | 70 | 70 | 74 | 72 | 71 | 58 |
| 1916 | max. | 90 | 90 | 92 | 92 | 93 | 92 | 94 | 100 | 98 | 100 | 94 | 90 | 100 |
| | min. | 72 | 72 | 72 | 73 | 72 | 56 | 56 | 68 | 68 | 70 | 64 | 72 | 56 |
| 1917 | max. | 92 | 90 | 91 | 92 | 90 | 94 | 96 | 98 | 100 | 94 | 92 | 90 | 100 |
| | min. | 72 | 70 | 72 | 72 | 60 | 65 | 64 | 62 | 62 | 70 | 72 | 72 | 60 |
| 1918 | max. | 90 | 87 | 88 | 89 | 92 | 92 | 93 | 93 | 95 | 95 | 97 | 94 | 97 |
| | min. | 71 | 72 | 72 | 72 | 71 | 59 | 62 | 67 | 70 | 73 | 70 | 71 | 59 |
| 1919 | max. | 94 | 91 | 93 | 93 | 96 | 96 | 96 | 97 | 97 | 96 | 96 | 94 | 97 |
| | min. | 70 | 75 | 74 | 72 | 70 | 66 | 72 | 60 | 68 | 72 | 74 | 75 | 60 |
| 1920 | max. | 94 | 92 | 93 | 92 | 93 | 95 | 96 | 96 | 96 | 94 | 98 | 92 | 98 |
| | min. | 76 | 74 | 76 | 74 | 74 | 61 | 66 | 63 | 65 | 72 | 73 | 74 | 63 |
| 1921 | max. | 96 | 96 | 92 | 93 | 94 | 93 | 95 | 96 | 98 | 96 | ..... | ..... | 98 |
| | min. | 76 | 74 | 74 | 72 | 73 | 60 | 60 | 64 | 64 | 70 | ..... | ..... | 60 |
| Mean max. | | 92.8 | 91.4 | 91.9 | 91.9 | 92.1 | 92.5 | 93.8 | 96.3 | 96.7 | 95.7 | 94.7 | 92.4 | 98.0 |
| Mean min. | | 73.1 | 73.3 | 73.3 | 72.7 | 69.5 | 64.3 | 64.0 | 64.8 | 68.1 | 72.2 | 72.4 | 72.0 | 60.6 |

[1] Cf. this REVIEW 50:8.